



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/697,831 | 10/30/2003 | Steven J. Hamrock | 59055US002 | 9256 |
| 32692 | 7590 | 08/17/2006 | EXAMINER | |
| 3M INNOVATIVE PROPERTIES COMPANY PO BOX 33427 ST. PAUL, MN 55133-3427 | | | KALAFUT, STEPHEN J | |
| | | | ART UNIT | PAPER NUMBER |

1745

DATE MAILED: 08/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|---------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/697,831 | Applicant(s) HAMROCK ET AL. | |
| | Examiner Stephen J. Kalafut | Art Unit 1745 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-8, 22-29, 45 and 48 is/are allowed.
- 6) ☒ Claim(s) 9, 11-13, 15-17, 19-21, 30, 32, 33, 35-39, 41, 42, 44, 46, 47, 49 and 50 is/are rejected.
- 7) ☒ Claim(s) 10, 14, 18, 31, 34, 40 and 43 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>(2 dates)</u> . | 6) <input type="checkbox"/> Other: ____. |

Art Unit: 1745

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 30, 32, 35-39, 41, 42, 44, 46, 47, 49 and 50 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Appleby *et al.* (US 6,649,299).

Appleby *et al.* disclose a fuel cell with a polymer electrolyte membrane, the membrane being made of a polymer that has pendant groups of $-\text{CF}_3$ and $-(\text{CF}_2)_x\text{SO}_3\text{H}$, where x is 2 (for Nafion) or varies from 2 to 5 (for Aciplex). See column 9, lines 14-29. Where x is 2, 3, or 5, the pendant group would fall into claim 38, which corresponds to x not equaling 4. The equivalent weight may be 900, 1000, or 1100 (column 9, lines 29-32). The thickness may be 25 or 50 microns (column 9, lines 37-38). These polymers have a glass transition temperature “of about 155 °C” (column 8, lines 65-66). Since “about” would encompass values both slightly above and

Art Unit: 1745

slightly below the stated number, “about 155 °C” would encompass slightly below 155 °C, which would fall into the presently recited range for Tg. At best, the values for Tg “about 155 °C” would be indistinguishable from the recited endpoint of “155 °C”. Thus, these claims would be anticipated or at best obvious over Appleby *et al.* Recitations in the dependent claims of how the membrane was made are treated under product-by-process practice, as are claims 46 and 47, which are evaluated for the resulting membrane product, rather than the steps of the process that made them. See MPEP 2113 and the cases cited therein. The product produced by the processes of claims 9 and 16 would be essentially the same membrane recited in claims 30 and 38.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Appleby *et al.*

This claim recites a pendant group corresponding to that disclosed by Appleby *et al.*, where x is 4 (column 9, lines 25-29). Since this is encompassed by the disclosed range of 2 to 5, this claim would be obvious over Appleby *et al.*

Claims 9, 11-13, 15-17, 19-21, 35, 37, 42, 44, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleby *et al.* in view of Hamrock *et al.* (US 2004/0121210) and Eisman *et al.* (US 5,302,269).

Claims 9, 11-13, 15-17 and 19-21 differ from Appleby *et al.* by reciting the method for forming the polymer into a membrane, by casting it from a solution and then annealing it at a temperature that is at least 10 °C greater than its glass transition temperature (Tg), but lower than 210 °C. Hamrock *et al.* (corresponding to Serial No. 10/325,278, cited by applicants) disclose a method of making an ion conducting highly fluorinated polymer membrane (section 0019) by

Art Unit: 1745

casting it and then annealing it, at a temperature of 120 °C or higher, most preferably 150 °C or higher (section 0023). This does not relate the annealing temperature to T_g. Eisman *et al.* disclose a process of pressing an ion-conductive polymer to give it the ability to take up water, the pressing done at elevated temperature (“water of hydration”, column 9, lines 41-45). The temperature is preferably above T_g, but below the thermodegradation temperature of the polymer (column 10, lines 9-13). Thus, Eisman *et al.* would guide the artisan to select an appropriate pressing temperature, in relation to T_g, and also below a maximum limit. Because the pressing would affect the polymer’s ability to absorb water, which is beneficial in fuel cell operation as taught by Appleby *et al.* (column 8, line 65 through column 9, line 2), it would be obvious to prepare the polymer membrane of Appleby *et al.* by casting and annealing as shown by Hamrock *et al.*, and within the temperature guidelines of Eisman *et al.* Claims 35, 37, 42, 44, 46 and 47 are in product-by-process format. Claims 46 and 47 would be the product of the processes of claims 9 and 16, respectively, while claims 35, 37, 42 and 44 would be polymers disclosed by Appleby *et al.*, but also cast and annealed. Since the process of making these membranes would be obvious for the reason stated above, so would the resulting membranes, even when the steps in the process that made them are considered.

Claims 10, 14, 18, 31, 34, 40 and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. These claims recite polymer membranes, or processes of making them, where the glass transition temperature is outside those

Art Unit: 1745

disclosed by the prior art cited above, or which include side chains not taught by the prior art for a polymer with the characteristics recited by the respective parent claims.

Claims 1-8, 22-29, 45 and 48 are allowed. These claims recite a blend of two or more polymers, for the membrane it process of manufacture, which has the recited glass transition temperature, equivalent weight and sulfonic acid pendant group.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hane *et al.* (US 5,004,648) and Masuda (US 4,423,157) disclose ionically conductive polymers with fluorinated backbones and sulfonic acid pendant groups.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

sjk



STEPHEN MALAFUY
PRIMARY EXAMINER
GROUP 1700